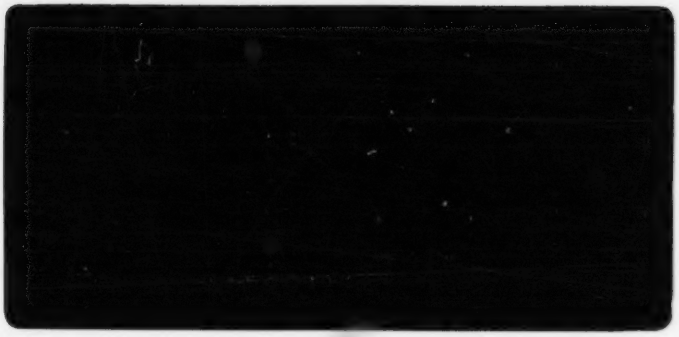
Labour and
Employment

Occupational Health
and Safety Branch



It's in your hands.

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The Management of Perchloroethylene

Perchloroethylene (tetrachloroethylene) has been used for 40 years as a solvent in dry cleaning operations. It offers advantages over other solvents previously used since it is non-flammable and readily recoverable for re-use. However, unless it is properly handled and controlled, it can cause health problems.

Potential worker exposure to dry cleaning solvent may result from leaks in the cleaning plant, improper maintenance procedures and handling garments containing residual vapours. The following recommendations are made to assist employers to control these exposures.

The Occupational Health and Safety Regulations require that the concentration of perchloroethylene in workplaces be maintained at below 50 parts per million (ppm) or 335 milligrams per cubic metre of air (mg/m^3) when averaged over an 8 hour period.

Workplace and Storage Design

Small storage tanks may be placed inside the building. Any room containing a tank should be fitted with mechanical exhaust ventilation and a fresh air inlet.

Bulk storage tanks for dry cleaning solvents should preferably be placed in the open air. Drums containing in excess of 76 litres (20 gallons) of solvent should be considered as storage tanks. Drums of solvent should be stored in a dry, cool place.

Proper storage racks and dispensing taps should be provided and maintained to prevent dripping. Catch pails should be emptied immediately after use. Where possible, solvents should be fed by gravity flow pipe systems to the cleaning plant.

Ventilation

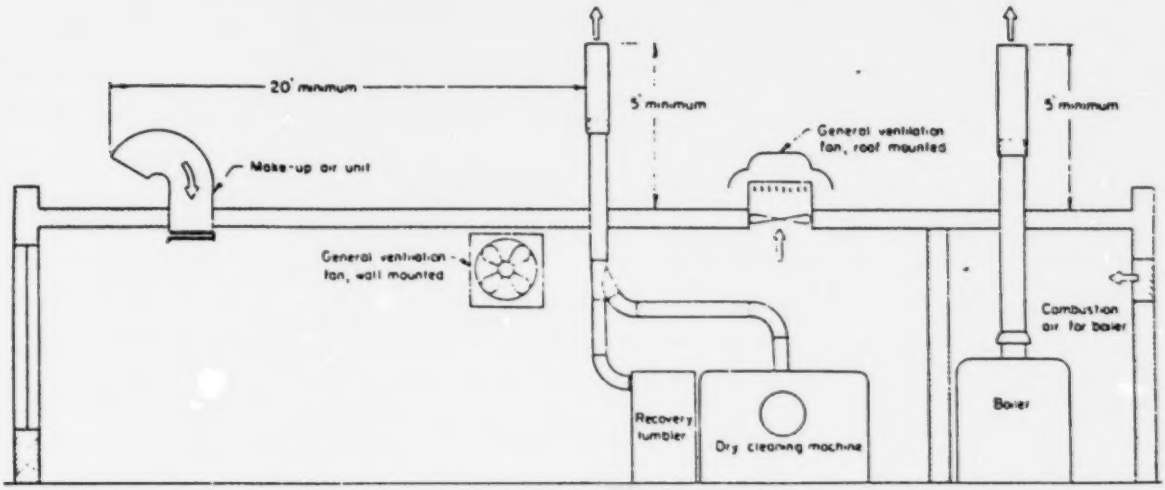
Ventilation, which operates automatically when the doors are opened for loading and unloading, should be provided on washers and dryers. Air should flow inward through the open doors at a rate of at least 0.5 metres per second (approximately 100 linear feet per minute). Washers and dryers must be equipped so that they will not operate when the doors are open.

All plants should have a general ventilation fan capable of changing the air every five minutes in addition to the local exhaust extractors on machines and solvent reclean systems. Air exhausted by these fans must be replaced by clean air and, where necessary, suitably heated or cooled to maintain satisfactory thermal comfort.

Perchloroethylene fumes should not be allowed to come into contact with an open flame in order to prevent their decomposition into toxic phosgene and hydrogen chloride gas. In particular, the furnace room should be isolated with an exhaust system which does not draw its combustion air from the parts of the building where the perchloroethylene is used.

Unless there is no possibility of vapours re-entering any building, perchloroethylene vapours should be scrubbed from the exhaust air. The removal of vapours and the location of the exhaust stack is particularly critical in business blocks where even trace amounts of vapours entering the air intakes can cause offensive odours to neighbours.

A typical commercial dry cleaning plant installation layout



The following should be included in a dry cleaning installation:

1. A general ventilation fan with a certified rating to deliver 5000 cfm at ¼" S.P. resistance of systems including louvres, ductwork, etc. (Fan may be roof or side wall installation).
2. Provision for replacement air equal to general exhaust capacity must be provided. One square foot for each 500 cfm of general exhaust fan capacity.
3. All joints on discharge stacks from dry cleaning equipment must be sealed or taped.
4. Consideration must be given to location of discharge stacks, replacement air and combustion air openings so as to minimize re-entry of solvent vapours.

Equipment and operations should be organized in such a way that fresh air currents can be used to remove vapours from the breathing zone of workers. No one should be "downwind" from hanging rails, spotting tables, etc. Where necessary, small table fans may be employed to advantage. Do not smoke in areas were perchloroethylene vapours are present.

Plant Operation

Maintenance of dry cleaning plants and any operation necessitating the manual handling of solvent should only be carried out with the fans running. Where practical, another reliable person should be present in case an emergency develops.

In the drycleaning process, the major sources for possible excessive exposure to perchloroethylene are during maintenance of the filters, from the solvent reclamation system and from cleaning spills. Personal protective equipment (ppe) should be available at every drycleaning establishment for use by workers when doing such tasks. This equipment should include organic, cartridge-type respirators and coveralls or aprons and long-sleeved gloves made of material such as nitrile, PVA or neoprene which resists penetration by the solvent.

A good standard of housekeeping should be maintained to prevent vapours escaping into the workshop atmosphere. Sludge, lint, filter cartridges, etc., should never be kept lying around inside the establishment. They should be placed immediately into a closed receptacle and taken outside as soon as possible. Cleaning materials such as rags and mops should be stored away from the work area and, where possible, in a separate storage area with exhaust vents.

The washer and dryer must be used according to manufacturer's instructions and no attempt should be made to modify the timing cycles to permit rapid throughput of clothing.

Plant equipment should frequently be examined for faults and repair made without delay. Joints in ductwork and gasket seals should be in good condition with no detectable leaks. Be especially careful with button and lint traps, the still viewing glass, filling door and the end plates of the filter systems. Joints in pipes should be well fitting and taped. Pay particular attention to areas where back pressure may occur such as elbows and filters.

A system of drain pans, gutters, etc., should be provided to prevent solvent spills from escaping. It is preferable to utilize gravity drains and vented holding tanks where reasonably practicable.

Spill Clean-Up Measures

The simple technique of mopping up by hand with rags or paper is potentially dangerous because the head is lowered into a position where the heavier vapours of perchloroethylene will have accumulated. Any procedure which causes a person to place the head in a low position will require that self-contained breathing apparatus be worn. The precautions to be taken when cleaning up spills depends upon the extent and manner of the spill.

1. Minor spills (less than 2 litres)

   (a) Personal protective equipment: gloves and cartridge-type respirator suitable for protection against organic vapours.

   (b) Manner of clean-up: ventilate the area affected as much as possible. Cover the spilled perchloroethylene with sawdust, sand or other absorbing material. Using a long handled shovel; scoop residue into a container; repeat with fresh absorbent until area is dry; seal container; and take to a safe place outdoors for disposal.

2. Large spills in a cool, open area

   (a) Personal protective equipment: canister respirator suitable for protection against 2% organic vapours, boots and gloves.

   (b) Manner of clean-up: do not enter area without respiratory protection. Remove any person affected by the vapour. Call for assistance. Ventilate the area.

   Only after assistance has arrived should attempts be made to stop the source of the spill and begin clean-up.

   Use absorbent to clean up the spill, following procedures outlined in (1) (b). Take advantage of fresh air ventilation to minimize exposure. If odours are detectable through the respirator, leave the area for fresh air. The assistant should not participate directly in the clean-up but should be present to assist if further difficulties arise. The assistant also should wear a canister respirator.

3. Large spills in a small room or confined space, or where solvent is hot or spills onto a hot surface.

   (a) Personal protective equipment: self-contained breathing apparatus, gloves, boots and coveralls.

   (b) Manner of clean-up: same as above in (2) except that assistant must stand ready for rescue with a self-contained breathing apparatus.

   Ventilate after clean-up for at least 20 complete air changes before re-entering. Wear a canister-type respirator when inspecting the area of the spill.

First Aid

Perchloroethylene should be handled cautiously so as to avoid exposure to the liquid or its fumes, as far as reasonably practicable. The following first aid measures should be practiced in the event of exposure.

Vapour overexposure

Exposure to high vapour concentrations can cause anaesthetic effects or intoxication, dizziness, headaches and disturbance of the central nervous system.

— Remove to fresh air.
— Get medical attention immediately.
— Apply artificial respiration if breathing has stopped.
— **Do not use adrenalin or similar acting medications.**
— Keep warm and quiet.

Solvent in eyes

— Wash with fresh running water for at least 15 minutes.
— Seek medical attention if irritation or other symptoms persist.

Solvent on skin or clothes

Perchloroethylene will dissolve the natural protective barrier of fats and oils from the skin leaving it unprotected against irritation, damage and infection.

— Remove clothes or shoes. Do not wear again until dry.
— Wash affected skin with soap and water.
— Apply a lubricating or softening cream to the affected areas.

Dry, scaly forearms and hands are the typical chronic effects of exposures to the solvent.

Solvent swallowed

— Do not induce vomiting.
— Obtain medical attention immediately.

Further information

A Material Safety Data Sheet (MSDS) should be available from the manufacturer or supplier of the product. If you have difficulty obtaining Material Safety Data Sheets or chemical hazard information from your supplier, contact:

Saskatchewan Human Resources, Labour and Employment
Occupational Health and Safety Branch
1870 Albert Street
Regina, Saskatchewan
S4P 3V7

Telephone: (306) 787-4496

Regina Office

Inquiry	787-4496
Workplace Safety Unit	787-4134
Occupational Hygiene Unit	787-4506
Chief Toxicologist	787-4485
Chief Radiation Health Physicist	787-4486

Saskatoon Office
3130 - 8th Street East
S7K 2H6

Workplace Safety Unit	933-5051
Mine Safety Unit	933-5055

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